

PROJECT RESEARCH AND ANALYSIS UNDERTAKEN AND DOCUMENTS COMPLETED

(PARTIAL LISTING)

TO: Lorri McKnight
Ruidoso Village Manager

FROM: Dick Seely, President, Seely & Associates,
Bob Moore, Senior Consultant, Seely & Associates

SUBJECT: EPA project analysis and recommendations

DATE: February 10, 2003

EPA Project Background

The EPA project was originally intended to improve the wastewater collection lines in the Village. Following the passage of the FY 2002 congressional appropriation, Seely & Associates transformed the request into a wastewater treatment plant expansion project. This expansion will address periodic increased influent volumes and assist the Village to reduce the elevated level of phosphorus in the water system as mandated by State of New Mexico Environment Department. During this time Molzen-Corbin & Associates was retained by the Village as the project design engineers.

The EPA grant is a 55/45 grant with 45% of the funds/resources being matched by the Village. The terms of the grant were approved and endorsed by the Village Council and Mayor Eggleston. The project is a complex one requiring coordination with the Village of Ruidoso Downs and other communities that send influent to the sewage plant in addition to the amount generated by the Village of Ruidoso. Participation in the funding of the required 'match' of the grant on a fair basis needed to be resolved with Ruidoso Downs and the phosphorus problem had to be addressed.

Preliminary Design Elements

Molzen-Corbin estimated that the complete project addressing increased periodic as well as greater permanent volume and the reduction of phosphorus to a level of 0.05 would cost a minimum of \$10,000,000. The Village requested the state conduct tests to establish the source of the phosphorus and to challenge the initial reports of high concentration. At this time Molzen-Corbin was requested to determine how much of the project could be built with the \$1,350,000 grant money and local match of \$1,071,000 in place. Molzen-Corbin stated that given the complexity of the issues, they could consume the entire sum in project design and engineering. After additional discussion, it was determined that two project elements could be pursued in the **first phase** of development that would be required in any case without consideration of the potential phosphorus problem. These elements are a **new lift station with submersible lift pumps replacing older screw lift pumps**

and installation of additional screening and grit removal capabilities by installing a new mechanical bar screen and an aerated grit chamber. The first phase as suggested by Molzen-Corbin will use the entire amount of money available in the grant.

An alternate solution to address the periodic increased influent volume as well as the permanent increased volume, due to population growth, was presented to the Village by Seely & Associates. This solution will cost considerably less than the Molzen-Corbin design.

Seely & Associates Analysis and Recommendations

The cost and design of the first phase of the project described above and proposed by Molzen-Corbin was preliminarily analyzed by Seely & Associates and its consultants. The report provided to Seely & Associates indicated that the design warranted further review due to inordinate high cost and over-design for the application. The findings were not conclusive but did indicate a review would be prudent.

During this time, the revised Molzen-Corbin project plan has received preliminary approval from EPA and the agency officials indicate that by February 15 the executed agreement should be sent to the Village. In order to receive the monies, the environmental clearance needs to be completed and as a part, a facility plan must be prepared and accepted as well.

Bill Black of EPA suggested that Seely & Associates contact Stephanie DuBois in the New Mexico Environment Department to agree upon the project action plan covering the next several months. Ms. DuBois is the New Mexico administrator for the Ruidoso EPA project. A telephone conference was held with Ms. DuBois. She was pleased to be in the communication loop and updated on the status of the project and suggested that Steve Baumgarn at the New Mexico Surface Water Bureau be contacted to discuss the facility plan, further environmental clearance and the current status of the phosphorus study.

Seely & Associates contacted Steve Baumgarn who informed firm officials that the Village was not in violation of their discharge permit at this time and that it had until January 2004 to comply with EPA current standards. Mr. Baumgarn urged the completion of the facility plan. Mr. Baumgarn also indicated that the facility plan could possibly be in two parts, one addressing the first phase of the project relating to influent volumes and the second dealing with the phosphorus situation. He revealed that the current studies showed that significant amount of phosphorus containing compounds were being introduced into the Village wastewater by soaps, cleaning solutions, fertilizers, discharge from the racetrack and septic tank overflow from the Mescalero Reservation. The general consensus is that if these sources of phosphorus containing compounds were addressed and the source eliminated or reduced, the requirements of the sewage treatment facility would be reduced to a great extent. In his opinion, a pro-active position by the Village to address these issues would enable EPA to consider an extension of time to reduce the phosphorus levels to the EPA required standard.

In view of this information Seely & Associates recommends the following:

1. The Village of Ruidoso and Ruidoso Downs Councils enact strict regulations prohibiting the use of any soaps or cleaning solutions containing phosphorus or phosphorus compounds within their jurisdictions. This would include hotels, motels, laundries, restaurants, car washes and other businesses. Severe monetary penalties should be included in the regulations.

2. The Village immediately require that fertilizer used on golf courses, lawns, parks, and other areas containing phosphorus or phosphorus containing compounds, and other potentially toxic components cease being used. Alternative fertilizers are readily available.

3. Analyze the amount of and solutions to the septic overflow from the Mescalero Reservation. (Seely & Associates would be happy to assist the reservation in obtaining funding to address this problem on a fee basis.)

4. Study the discharge from the racetrack area to determine sources and solutions to this potential contributing factor to the phosphorus levels.

A significant reduction in the amount of contaminants being introduced into the waste water will have a direct effect on the requirements of the sewage treatment plant. This will in turn reduce the need for equipment to remove the phosphorus compounds and reduce the cost of the treatment facility. These positive actions to address the question of phosphorus levels and possible remedies will greatly enhance the Village's position with regard to meeting EPA standards and the time frame to reach the goals.

Seely & Associates looks forward to continuing to work with the Village to reach a solution to these problems and the completion of a successful project.

Burton Engineers, Inc.

2900 Vista Grande Dr., NW Albuquerque, NM 87120

Phone: 505-839-9365 FAX: 505-839-0610 email: RBurton908

@AOL.com

Memorandum

To: Dr. Richard Seely
From: Richard L. Burton, P.E.
Date: February 18, 2003
Subject: Ruidoso

I discussed the Ruidoso project with Jim Martinson of Falcon Supply in Denver, and he wanted to furnish me information on a Lift Station for the 3.7 mgd design flow. This completely contained unit sells for \$230,000.00, not including site work and installation. The complete installed cost for this lift station would be less than \$300,000.00. (Note that it includes the building, controls, standby generator, etc.). I have attached a plan, section and pump curves.

The only thing it does not have, that was mentioned in the grant application, is an aerated grit chamber. An aerated grit chamber could be added, and it would increase the cost by about \$200,000.00. I didn't add the grit chamber because I am not convinced that they need it.

If you have any further questions or concerns, please let me know.

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Memorandum

To: Dr. Richard Seely
From: Richard L. Burton
Date: April 18, 2003
Subject: Ruidoso WWTP

It is clear that the Village of Ruidoso needs to review their options before starting the head works or any other construction on a new treatment plant because of the ongoing phosphorus problem. As you know, most phosphorus removal plants that use biological processes have a limit of 2-3 ppm. Chemical addition typically brings this down to about 1ppm. I have discussed the matter with one engineer in Pennsylvania who said that they are meeting a 0.2 ppm limit with chemical addition and filtration.

The Preliminary Engineering Report needs to begin with ways to reduce the phosphorus level upstream. I know the latter is the focus of Village activities at the present time. We recommend, for example, that if the golf course is the culprit, it should be fairly easy to build a catch basin for the irrigation and rainwater and treat this water for phosphorus removal by a biological method. We researched this and found several systems that could be applicable. One method is a reed bed that could become a part of the golf course landscaping. These beds have been tried in various places and are of course more efficient in warmer climates. The most northerly one we found is in Montreal, Canada. They claim 64% removal of phosphorus with the additional benefit of 60% nitrogen removal. These numbers will vary with the contaminants in the drainage water, but this is an inexpensive way to solve the problem and could lead to a change in the discharge permit. The Lasis Companies in Taos have studied similar systems and I think that this is a project that they would be interested in.

A second solution would be to find another point of discharge. It would certainly seem reasonable to pump the effluent to an alternative location or another point further down stream.

I recommend that the Engineer be instructed to consider the following alternatives.

- 1) Reduce the other sources of phosphorus so that the phosphorus in the discharge permit can be higher. There are reasonable, inexpensive solutions if the level can be raised to 2 - 3 ppm.
- 2) See if the Village efforts to reduce the permit limits are successful. If the permit can be changed to allow 98% removal of nitrogen and 60% removal of phosphorus, the existing plant can be inexpensively modified to remove contaminants to these levels.
- 3) I would try to avoid chemical addition solutions. They are extremely expensive. They produce a chemical sludge. They can not be used in conjunction with nitrogen removal.
- 4) Before millions of dollars are spent on a new plant, several other alternatives should be considered.
 - a) Reuse of wastewater for irrigation and/or winter snowmaking.
 - b) Pump wastewater to any area that has less stringent discharge requirements, such as crop irrigation, constructed wetland sites, etc.

Technical Notes:

At the outset, phosphorus occurs in wastewater at 4-15 ppm with a common number of around 10 ppm. The EPA has set the discharge permit limit in Ruidoso at 0.1 ppm. This is 99% removal. There are two basic ways to remove phosphorus. One is by biological removal and the other is by chemical addition with precipitation and/or filtration. There are a lot of variations of these two basic processes.

Microbes utilize phosphorus during synthesis and energy transport and as a result, 10 - 30% of the phosphorus is removed by the mechanical biological (secondary) treatment such as activated sludge or extended aeration. I believe the existing plant in Ruidoso could be removing up to 30% of the phosphorus.

When enhanced phosphorus removal is needed, the process is modified so that the sludge is exposed to both anaerobic and aerobic conditions. This is a two-step add-on for secondary plants.

The Anaerobic Step Under anaerobic conditions, facultative bacteria will release soluble phosphorus into the water and absorb BOD. The absorbed BOD is stored until it can be utilized under aerobic conditions. The released phosphorus comes from adenosinetriphosphate (ATP) that is a stored energy form inside the bacterial cell. The bacteria break the phosphate bonds of the ATP to obtain enough energy for absorbing the BOD.

The Aerobic Step Following the anaerobic step, the bacteria begin to oxidize

the stored BOD under aerobic conditions. The stored BOD is usually in the form of polyhydroxybutyrate (PHB). PHB is a form of stored carbon that shows up as an intracellular inclusion. Also during the aerobic step, the bacteria rebuild the stored energy ATP. To rebuild the ATP, they remove soluble phosphorus from the waste stream. If the bacteria are conditioned to an anaerobic/aerobic cycle, the phosphorus uptake rate in the aerobic zone can be very high. Very high means about 60% removal.

So the biological processes will produce a 30% reduction at the secondary level and 60% reduction at the tertiary level $10 - 3(10) = 7$ ppm and $7 - 6(7) = 2.8$ ppm. We have a total of 72% reduction and can expect to discharge 2.8 ppm phosphorus. The obvious conclusion is that you cannot meet or even approach the permit limit with the biological phosphorus removal process.

The next option is chemical addition and precipitation, and possibly filtration. Phosphorus in wastewater occurs as orthophosphate (30%), polyphosphate (35%), and organically bound phosphate (35%). Phosphate can be removed by various multi-valent metal ions, calcium, aluminum, iron, etc. Lime can be used in water that has natural bicarbonate alkalinity, but most treatment plants use either aluminum sulfate or ferric chloride.

There are different points in the treatment process where chemical addition can take place. Chemical addition, as the primary step, seems to be the most efficient way to eliminate phosphate, but it will increase the volume of primary sludge to be handled. It may interfere with thickening chemicals used in the solids handling system. It does reduce the load on the secondary system, but I think that the excess sludge is counter productive. It has to be disposed of in a landfill and it can contain high aluminum levels. You are solving one problem and creating another.

We agree with the plant schematic that shows chemical phosphorus removal near the end of the process. The schematic does not show filtration after the chemical phosphorus removal. The best numbers we can find for chemical removal of phosphorus without filtration are in the 60% to 70% range. The most optimistic discharge level will be around 1.0 ppm or 10 times the Village permit limit. Even if they add filtration and can get down to 0.2 ppm. The Village will have spent 20 million dollars and will not meet their permit limit.

I think that when regulatory agencies set seemingly impossible conditions, it is essential that engineers find creative solutions to the problem. In this case, it is simply not possible to discharge the wastewater in this section of the Rio Ruidoso. It is foolish to take the attitude that we are going to do the best we can and discharge anyway. There are two solutions: 1) get the permit changed, or 2) discharge somewhere else.

Burton Engineers, Inc.

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Phone: 505-839-9365 FAX: 505-839-0610 email: RBurton908

@AOL.com

Memorandum

To: Dr. Richard Seely
From: Richard L. Burton
Date: February 3, 2003
Subject: Ruidoso Grant Application

Based on the information available, the Lift Station size and cost need to be reviewed further. The population of Ruidoso is less than 10,000 people, Ruidoso Downs may be 2000. We usually use 50 gpcd for wastewater for homes, and 75 gpcd for hotel and motel units. This would be a flow of 600,000 gpd plus the vacation flows. I don't know what the vacation time peak flows are, but if they are 100%, the flow would be 1.2 mgd or less than 1/3 of the proposed design capacity.

I would recommend that Ruidoso review the population projections. When they get a realistic idea of the population they are dealing with, they can move on to the design of the Lift Station.

We have some cost estimates for similar sized projects (1.5 mgd upgrade able to 3.0 mgd) and the estimated construction cost is \$750,000.00. The \$750,000.00 project is a fairly elaborate resort area project. It has flexibility for weekend and summer increases, and can be upgraded for a 100% increase in population. The peak flow was figured at 9000 gpm for a peaking factor of 4. Plans are to upgrade the station in 10 years with larger pumps. The piping was sized for future flows so the flow velocity will change from 2.5 fps to 5 fps with the future increase. The station can be upgraded with only a change in pump size and since the pumps normally last about 10 years the cost of the planned increase will be nominal.

VILLAGE OF RUIDOSO EPA WASTE WATER TREATMENT PLANT PROJECT PROJECT SUMMARY

The Village of Ruidoso and the City of Ruidoso Downs are currently implementing a major project to evaluate the alternatives available to modify the Joint Use Wastewater Treatment Plant in consideration of the following three pressing needs:

- 1) Increase the capacity of the treatment plant
- 2) Reduce effluent ammonia-nitrogen concentrations to meet NPDES permit limitations
- 3) Reduce effluent phosphorus concentrations to meet NPDES permit limitations

The extent of treatment facility modifications to address the ammonia-nitrogen and phosphorus limitations are dependant upon possible changes to the NPDES permit that may result from the bioassay activities currently being conducted by the New Mexico Environment Department on the Rio Ruidoso. Based on the current NPDES permit limitations, initial cost estimates for the required facilities are in excess of \$20 million.

However, two significant project elements have been identified which are required regardless of the NPDES permit limits and are common to all alternatives that have been considered. One project element is required to alleviate influent sewer surcharging conditions and consists of replacing the existing screw lift pumps with a new influent lift station with submersible sewage lift pumps. The new influent lift station would be sized to accommodate the anticipated wastewater flows for a 25-year planning period with a capacity of 3.75 mgd. The other project element is required to increase the capacity of the raw wastewater screening and grit removal facilities. The new facilities are proposed to be constructed to function in parallel with the existing screening and grit removal facilities at the treatment plant. The new screening and grit removal facilities consist of a new mechanical bar screen and an aerated grit chamber.

VILLAGE OF RUIDOSO

NEW INFLUENT LIFT STATION PROJECT

Project Summary

The Village of Ruidoso, working with the City of Ruidoso Downs, is currently implementing a major project to evaluate the alternatives available to modify the Joint Use Wastewater Treatment Plant in consideration of the following three pressing needs:

- 1) Increase the capacity of the treatment plant
- 2) Reduce effluent ammonia-nitrogen concentrations to meet NPDES permit limitations
- 3) Reduce effluent phosphorus concentrations to meet NPDES permit limitations

The extent of treatment facility modifications to address the ammonia-nitrogen and phosphorus limitations are dependant upon possible changes to the NPDES permit that may result from the bioassay activities currently being conducted by the New Mexico Environment Department on the Rio Ruidoso. Based on the current NPDES permit limitations, initial cost estimates for the required facilities are in excess of \$20 million.

Two significant project elements have been identified which are required regardless of the NPDES permit limits and are common to all alternatives that have been considered. The project the Village of Ruidoso has selected to implement is required to alleviate influent sewer surcharging conditions and consists of replacing the existing screw lift pumps with a new influent lift station with submersible sewage lift pumps. The new influent lift station would be sized to accommodate the anticipated wastewater flows for a 25-year planning period with a capacity of 3.75 mgd.

The other project element, which will be implemented under the Phase 2 design and construction plan is required to increase the capacity of the raw wastewater screening and grit removal facilities. The new facilities are proposed to be constructed to function in parallel with the existing screening and grit removal facilities at the treatment plant. The new screening and grit removal facilities consist of a new mechanical bar screen and an aerated grit chamber.

Workplan and Timeline

The Preliminary and Final Design Phases will provide the design for the project and the Contract Documents for construction.

During construction, administration activities and construction observation will be provided by the project management organization.

Construction - The construction phase of the project will include construction of pumping facilities, transmission and distribution lines, and water storage facilities.

OBJECT CLASS CATEGORIES WORKSHEET

PERSONNEL

POSITION	NUMBER	SALARY	WORK	
YEARS	AMOUNT			
Lorri McKnight, Village Manager	1	72,000	.45	
	32,400			
Cleatus Richards, Acting Engineering Director	1	47,000	.55	
	25,850			
John P. Waters, Ruidoso Downs Village, Village Administrator	1	70,000	.25	
	17,500			
John Ramos, Village of Ruidoso Environmental Department	1	45,000	.25	
	11,250			
Financial Staff	1	25,000	.30	
	7,500			
a. PERSONNEL TOTAL				\$

94,500 ✓

b.

FRINGE BENEFITS

Base	N/A
Rate 22%	20,790 ✓
b. FRINGE BENEFITS TOTAL	\$ 20,790

c. TRAVEL

Explain:	
Albuquerque to Ruidoso, round trip 200 miles (2 per month) = 48 trips @ 34 per mile =	
\$3264.	
Local travel 200 miles per week x 92 weeks @.34 per mile = \$6256	
c. TRAVEL TOTAL	

\$ 9520 ✓

OBJECT CLASS CATEGORIES WORKSHEET

d. **EQUIPMENT:** Tangible, non-expendable, personal property having a useful life of more

than one yer

and an acquisition cost of 35,000 or more per unit. Applicant's definition of equipment may be used provided the definition at least includes all items previously defined above.

ITEM	NUMBER	COST PER	UNIT
TOTAL			
d. EQUIPMENT TOTAL:			\$0

e. SUPPLIES

General office & other supplies \$200 month X 24 months	4,800
e. SUPPLIES	\$4.800 ✓

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OBJECT CLASS CATEGORIES WORKSHEET

f. CONTRACTUAL

List each planned contract or type of service to be procured. Agreements/contracts with other governmental agencies (state, local or Federal) should be listed under category h. OTHER	
Engineering/architecture: 1. Basic engineering services	

173,0

00

Project management/ administration: 1. Project and performance planning; RFP development, publication and vendor selection; and day-to-day administration. \$68,000 2. On-site observation	
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services -\$ 96,000 3. Project performance & evaluation - \$18,000 182,000

Contracted professional services: 1. Surveys - \$9250 2. Soil investigation - \$12,000 4.

Operation & maintenance manual - \$ 15,000 5. Operator training, video taping & startup - \$9,000

45,25

0

f. CONTRACTUAL TOTAL	\$
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400,250 ✓

g.

ONSTRUCTION

ITEM	NUMBER	COST PER	UNIT
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TOTAL

Construction Costs Lift Station, Headworks Facility Improvements			
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1,744,373

TOTAL CONSTRUCTION			\$
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1,744,373 ✓

h.

THER

Other: Explain by major categories	
New Mexico gross receipts tax (5.375%)	106,676
TOTAL OTHER	\$ 106,676

i. TOTAL DIRECT COSTS	\$2,380,909
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j. INDIRECT COSTS (RATE: %)	N/A
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k. TOTAL PROPOSED COSTS:	\$2,380,909
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FEDERAL FUNDS REQUESTED: 55% RECIPIENT SHARE OF TOTAL PROPOSED

COSTS: 45%	\$1,309,500
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\$1,071,409

CLEARINGHOUSE COMMENTS

Contact has been made with:

Mr. Ken Hughes
Single Point of Contact
New Mexico State Clearinghouse
DFA State Budget Office Division
Bataan Memorial Building, Room 201
Santa Fe, New Mexico 87501

Mr. Hughes is familiar with the detail and objective of the Ruidoso influent lift station project. A complete application package will be mailed to him for his review. Mr. Hughes will prepare a letter of approval for the project scope of work, which will be sent to EPA.

November 20, 2002

Mr. Billy Black
EPA Region 6 Coordinator
Wastewater Management Division
12th Floor, Suite 1200
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Black:


It is with pleasure that I submit on behalf of the Village of Ruidoso the EPA Wastewater Treatment Project application packet. We hope that this critically important project can begin in the very near future. I look forward to any comments you may have on the application. Please contact me if I can provide other information or material that you require.

Sincerely,

L. Leon Eggleston
Mayor
Village of Ruidoso

REGIONAL W W TREATMENT PLANT

WAGES + BENEFITS FOR TIME 11/03/2002-06/30/2003

W/C CODE	W/C RATE	POSITION	NAME	ANNUAL SALARY	FICA	PERA	WORK COMP	MED INS	ICMA	TOTALS
7580	0.0295	WWTP DIRECTOR	J RAMOS	30,868	2,361	3,442	919	5,848	0	43,438
8810	0.0034	VILLAGE MANAGER	L MCKNIGHT	47,357	3,623	5,280	169	5,848	2,658	62,277
8810	0.0034	DEPUTY MANAGER OF PUBLIC WORKS	C RICHARDS	40,054	3,064	4,466	144	4,211	0	51,939
		SUBTOTAL FULL TIME SALARIES		118,279	9,048	13,188	1,232	15,907	2,658	157,654
		WWTP DIRECTOR	J RAMOS	@ 10%	4,343.80					
		VILLAGE MANAGER	L MCKNIGHT	@ 10%	6,227.70					
		DEPUTY MANAGER OF PUBLIC WORKS	C RICHARDS	@ 20%	10,387.80					
		TOTAL		20,959						
This is to certify that the above is a true extract of salaries and benefits paid to the listed employees for the period from 11/03/2002-6/30/2003 and percentages of time allocated to Project XP-97630701 properly reflects their involvement with said project.										
										
Lorri McKnight, Village Manager-Treasurer				July 3, 2003 Village of Ruidoso, NM						



Village of Ruidoso

March 13, 2000

Seely & Associates, Inc.
7810 South Valley Drive
Fairfax Station, Va. 22039

Re: Approval of RFP #99-03 - Developing & Gaining Funding

Dear Mr. Seely,

The Village of Ruidoso Council acted upon the Selection Committee's recommendation for the above mentioned project to approve the three (3) firms who submitted proposals, your company being one. This is your notice to begin the appropriate action needed to act on the Village's behalf to find and develop applications for funds. Please remember that the Village will need to approve all funding ideas before proceeding and we will enter into separate contracts for each specific project.

Thank you for your interest in the Village of Ruidoso. Any questions concerning this please contract me at (505) 257-2721 or the Village Manager, Alan Briley, at (505) 258-4343.

Sincerely,

Terri Waterfield
Village of Ruidoso
Purchasing Agent